DRAFT April 20, 2016

PROGRESS REPORT OF THE PARTIES
GROUNDWATER ANNEX CHAPTER

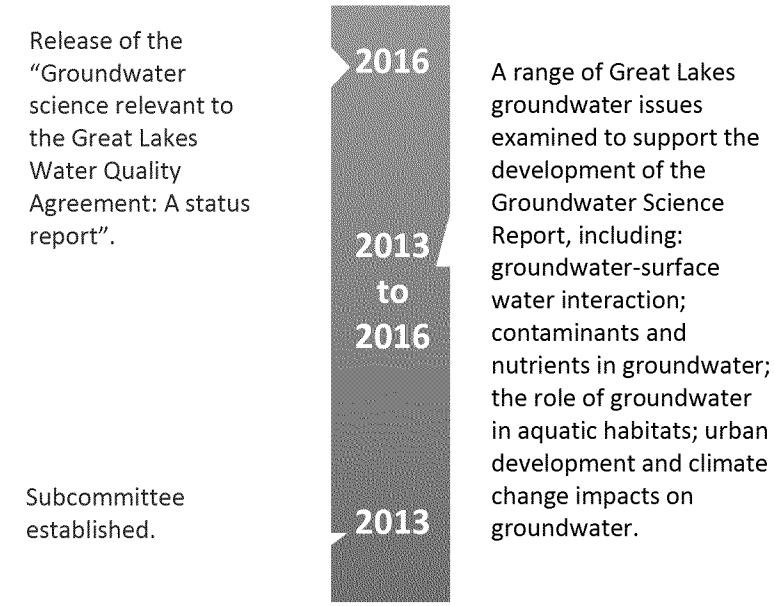
OVERVIEW

The Groundwater Annex of the 2012 GLWQA recognizes the interconnection between groundwater and the Waters of the Great lakes. Understanding the extent of the impact that groundwater has on the chemical, physical and biological integrity of the Great Lakes is necessary to manage and protect groundwater to help protect the Great Lakes.

It is for this reason that the Groundwater Annex commits Canada and the United States to coordinate scientific assessments of groundwater to better understand how groundwater affects surface water quality and quantity; and also commits Canada and the United States to coordinate groundwater management actions to protect and manage groundwater-related stresses affecting the Waters of the Great Lakes.

As a first step, Canada and the United States released an initial report on the relevant and available groundwater science in 2016.

PROGRESS TOWARD MEETING GLWQA COMMITMENTS



[Possibly include cover page of GW Science Report.]

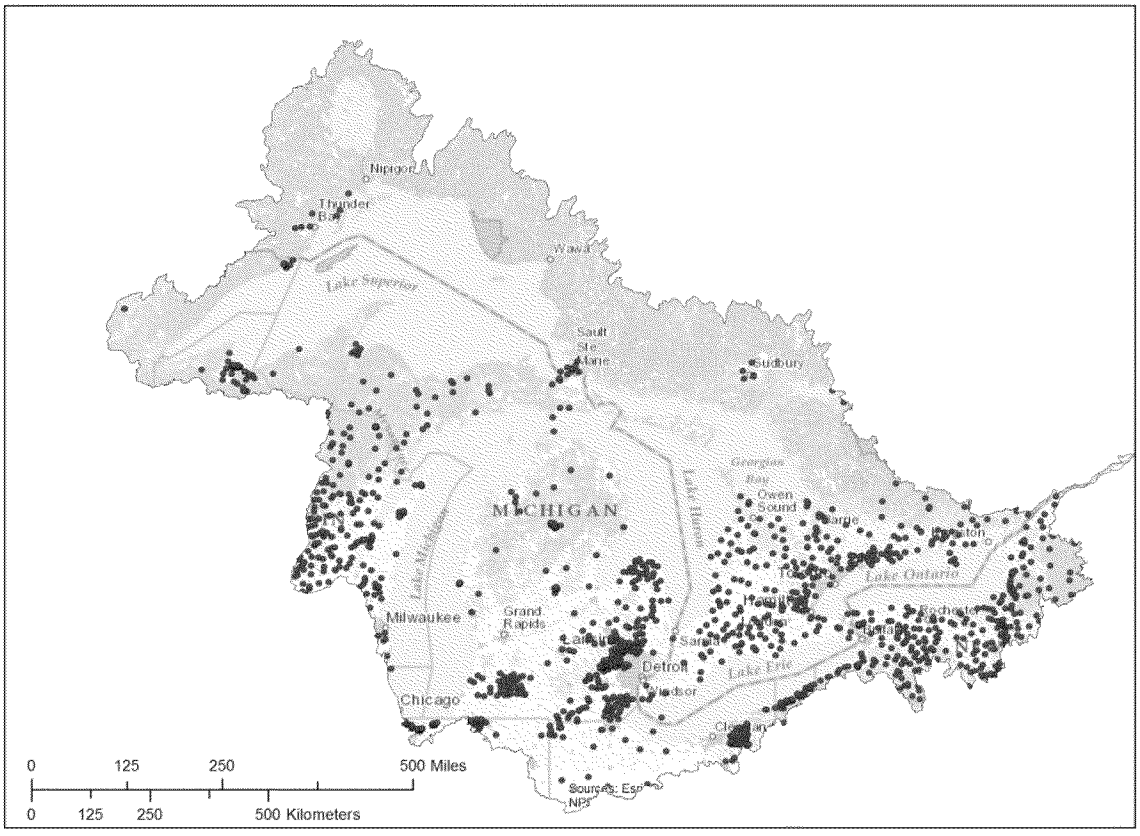


Figure x - Locations of monitoring wells in the Great Lakes Basin with publicly available water quality analyses

This annex is implemented by the Groundwater Annex Subcommittee, co-led by Environment Canada and the U.S. Geological Survey. Organizations on the subcommittee include:

OhioEPA Ontario Conservation Ontario OGL

Environment Canada Environnement Canada USGS science for a changing world

BINATIONAL ACTIONS TAKEN FOR KEY COMMITMENTS

Within two years of entry into force of this Agreement, publish an initial report on the relevant and available groundwater science.

Identify groundwater impacts on the chemical, physical and biological integrity of the Waters of the Great Lakes; analyze contaminants, including nutrients in groundwater, derived from both point and non-point sources impacting the Waters of the Great Lakes; assess information gaps and science needs related to groundwater to protect the quality of the Waters of the Great Lakes; and analyze other factors, such as climate change, that individually or cumulatively affect groundwater's impact on the quality of the Waters of the Great Lakes.

- An initial report on the relevant and available Great Lakes groundwater science was published and released for public comment on December 3, 2015. The report titled, "Groundwater science relevant to the Great Lakes Water Quality Agreement: A status report", available on http://binational.net/2015/12/03/groundwater-science/, provides the current state of science on groundwater and its relation to Great Lakes water quality by examining various issues such as the importance of groundwater-surface water interaction and interconnection; contaminants and excessive nutrients in groundwater; the influence of groundwater in providing aquatic habitats with a focus on Great Lakes nearshore areas, streams, and wetlands; the influence of urban development and climate change on groundwater quantity and quality; as well as, summarizes the major science gaps and needs. This report provides a better basis and understanding of the issue of groundwater in the Great Lakes and its influence on the quality of the Waters of the Great Lakes; helps assess whether groundwater improves or adversely impacts Great Lakes water quality; and supports future groundwater science and management actions.

Identify priorities for science activities and actions for groundwater management, protection, and remediation, to achieve the General and Specific Objectives of this Agreement; and

Coordinate binational groundwater activities under the GLWQA with domestic groundwater programs to assess, protect and manage groundwater impacting the waters of the Great Lakes.

- Information from the Groundwater Science Report, including the science gaps and needs, will be used to draft the 2017-2019 Binational Groundwater Priorities for Science and Action, which will be presented for public input at the Great Lakes Public Forum in October 2016.

- Discussions with other Annex Subcommittees will soon be undertaken to inform these 2017-2019 Binational Priorities; to determine if there needs to be a focus on coordinating specific binational groundwater activities; and to determine the need for surveillance of groundwater quality for priority areas.

DOMESTIC ACTIONS TAKEN

CANADA

Assess information gaps and science needs related to groundwater to protect the quality of Waters of the Great Lakes.

- In March 2015, the Ontario Geological Survey and Geological Survey of Canada hosted a

Groundwater Geoscience Knowledge GAP Analysis session for southern Ontario clients. Session participants identified 30 individual groundwater geoscience knowledge gaps which include i) communications, ii) standards and protocols, iii) water quality and geochemistry, iv) surface and groundwater interaction, v) geology and hydrogeology, vi) climate change and vii) data management and dissemination. ~~The two Geological Surveys have taken significant steps to address many of the knowledge gaps identified.~~

Identify groundwater impacts on the chemical, physical and biological integrity of the Waters of the Great Lakes.

- The U.S. Geological Survey is continuing studies of selected areas of the Great Lakes Basin to evaluate the effects of land use and flow path on groundwater quality which, in turn, impact the Waters of the Great Lakes as groundwater interacts with surface water. The studies determine the age of sampled groundwater which shows that nitrate concentrations are generally higher in younger water from shallow wells.

- The State of Michigan has developed a water withdrawal assessment tool that evaluates the effect of large water withdrawals, including groundwater, on fish habitat in streams. The assessment tool has been used in Michigan for several years and is being evaluated by a few other Great Lakes States for possible implementation. Understanding the effects of groundwater withdrawal on stream habitat is an important consideration for the 2012 GLWQA.

- The Ontario Geological Survey continues to develop an improved understanding of provincial groundwater resources that establishes the data and information needed to assess the impacts of groundwater on the Waters of the Great Lakes. In particular, the ambient groundwater geochemistry project has created a water quality database that ~~is instrumental in~~ is being evaluated for potential use in the development of a groundwater indicator under the guidance of the Science Annex Subcommittee.

- Environment and Climate Change Canada is currently assessing the role of groundwater as a source of nutrients (phosphorus and reactive nitrogen) to surface waters of Southeastern Georgian Bay and the Nottawasaga River. This work is being supported by the Lake Simcoe / Southeastern Georgian Bay Clean-up Fund.

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